



MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each of the problems in the time allowed, then fill in the corresponding bubble on your answer sheet. Do not spend too much time on any one problem; skip the more difficult problems and go back to them later.

DO YOUR FIGURING HERE.

- The minimum fine for driving in excess of the speed limit is \$25. An additional \$6 is added to the minimum fine for each mile per hour (mph) in excess of the speed limit. Rachel was issued a \$103 fine for speeding in a 55-mph speed limit zone. For driving at what speed, in mph, was Rachel fined?
 - 48
 - 52
 - 62
 - 68
 - 78
- $5x^3 \times 2xy \times 3xy^2$ is equivalent to:
 - $10x^3y^2$
 - $10x^5y^3$
 - $30x^3y^3$
 - $30x^5y^3$
 - $30x^5y^2$
- What is the fourth term in the arithmetic sequence 13, 10, 7, ...?
 - 14
 - 9
 - 4
 - 0
 - 7
- When written in symbols, "the product of r and s , raised to the fourth power," is represented as:
 - r^4s^4
 - $(r + s)^4$
 - $(rs)^4$
 - $\frac{r^4}{s^4}$
 - rs^4

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DO YOUR FIGURING HERE.

- Which of the following numbers has the digit 5 in the thousandths place?
 - 5,000.00
 - 50.0
 - 0.05
 - 0.005
 - 0.0005
- Mandy and Jordan each bought some of the same notebooks and the same three-ring binder. Mandy paid \$5.85 for 3 notebooks and 1 binder. Jordan paid \$4.65 for 2 notebooks and 1 binder. What is the price of one of the notebooks?
 - \$2.70
 - \$2.25
 - \$1.80
 - \$1.20
 - \$0.75
- If $mn = k$ and $k = x^2n$, and $nk \neq 0$, which of the following is equal to m ?
 - 1
 - $1/x$
 - \sqrt{x}
 - x
 - x^2
- If $7x + 5 = 2x + 9$, then $x =$?
 - $\frac{4}{5}$
 - $1\frac{4}{5}$
 - $\frac{4}{9}$
 - $1\frac{4}{9}$
 - 2
- What percent of 5 is 7?
 - 14%
 - 35%
 - 71%
 - 140%
 - 157%

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10. If x is a positive real number such that $x^2 = 16$, then $x^3 + \sqrt{x} = ?$

F. 18
G. 20

H. 66

J. 68

K. 74

11. $-|-16| - (-16) = ?$

A. -16

B. 0

C. 4

D. 16

E. 32

12. A partial deck of cards was found sitting out on a table. If the partial deck consists of 6 spades, 3 hearts, and 7 diamonds, what is the probability of randomly selecting a red card from this partial deck? (Note: diamonds and hearts are considered "red," while spades and clubs are considered "black.")

F. $\frac{9}{16}$

G. $\frac{13}{16}$

H. $\frac{7}{16}$

J. $\frac{3}{8}$

K. $\frac{5}{8}$

13. Which of the following is a simplified form of $4x - 4y + 3x$?

A. $x(7 - 4y)$

B. $x - y + 3x$

C. $-8xy + 3x$

D. $7x - 4y$

E. $-4y - x$

DO YOUR FIGURING HERE.

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DO YOUR FIGURING HERE.

14. Gary has turtles, cats, and birds for pets. The number of birds he has is 4 more than the number of turtles, and the number of cats is 2 times the number of birds. Of the following, which could be the total number of Gary's pets?

F. 14

G. 18

H. 20

J. 22

K. 26

15. On a map, $\frac{1}{4}$ inch represents 12 miles. If a road is 66 miles long, what is its length, in inches, on the map?

A. $5\frac{1}{2}$

B. $5\frac{1}{8}$

C. $1\frac{1}{2}$

D. $1\frac{3}{8}$

E. $\frac{7}{8}$

16. If $b = a - 4$, then $(a - b)^3 = ?$

F. 64

G. 16

H. -4

J. -16

K. -64

17. If g is an integer, which of the following could NOT equal g^2 ?

A. 0

B. 1

C. 4

D. 8

E. 9

18. Justin owns 6 different dress shirts, 3 different pairs of pants, and 5 different ties. How many distinct outfits, each consisting of a shirt, a pair of pants, and a tie, can Justin make?

F. 14

G. 42

H. 90

J. 120

K. 144

19. An oil refinery produces gasoline from crude oil. For every 10,000 barrels of crude oil supplied, the refinery can produce 6,500 barrels of gasoline. How many barrels of gasoline can be produced from 3,500 barrels of crude oil?

A. 1,265

B. 1,750

C. 2,125

D. 2,275

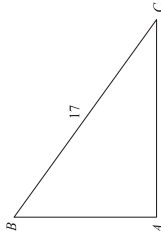
E. 5,385

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DO YOUR FIGURING HERE.

28. The hypotenuse of the right triangle $\triangle ABC$ shown below is 17 feet long. The cosine of angle C is $\frac{3}{5}$. How many feet long is the segment AC ?



- F. 6
G. 10.2
H. 12
J. 15
K. 28.3

29. When the choir is arranged in rows of 5 people each, the last row is one person short. When the choir is arranged in rows of 6 people each, the last row is still one person short. What is the least possible number of people in the choir?

- A. 29
B. 30
C. 56
D. 60
E. 99

30. What is the y-coordinate of the point in the standard (x,y) coordinate plane at which the 2 lines $y = \frac{x}{2} + 3$ and $y = 3x - 2$ intersect?

- F. 5
G. 4
H. 3
J. 2
K. 1

31. Points B and C lie on segment AD as shown below. Segment AD is 52 units long, segment AC is 23 units long, and segment BD is 27 units long. How many units long, if it can be determined, is segment BC ?



- A. 21
B. 18
C. 9
D. 4
E. Cannot be determined from the given information.

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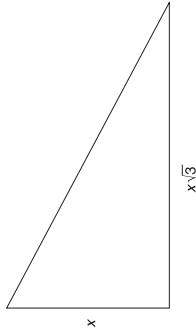


DO YOUR FIGURING HERE.

32. For all pairs of real numbers M and N where $M = 6N + 5$, $N = ?$

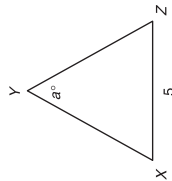
- F. $\frac{M}{6} - 5$
G. $\frac{M}{5} + 6$
H. $6M + 5$
J. $\frac{M - 5}{6}$
K. $\frac{M + 5}{6}$

33. In the figure below, the perimeter of the triangle is $12 + 4\sqrt{3}$ inches. What is the value of x , in inches?



- A. 2
B. 4
C. 6
D. 8
E. 12

34. In the figure below, $\overline{XY} = \overline{YZ}$. If $a = 40^\circ$, then $\angle XYZ = ?$

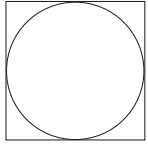


- F. 9.50
G. 8.75
H. 7.75
J. 6.25
K. 5.50

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DO YOUR FIGURING HERE.

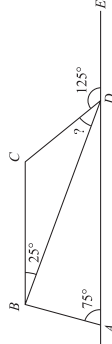
35. In the (x, y) coordinate plane, what is the y -intercept of the line $-9x - 3y = 15$?
- A. -9
B. -5
C. -3
D. 3
E. 15
36. The product of two integers is between 137 and 149. Which of the following CANNOT be one of the integers?
- F. 15
G. 13
H. 11
J. 10
K. 7
37. When x is divided by 7, the remainder is 4. What is the remainder when $2x$ is divided by 7?
- A. 1
B. 4
C. 5
D. 7
E. 8
38. A circle is circumscribed within a square with sides of 12 feet, as shown below. What is the area of the circle, to the nearest square foot?
- 
- F. 144
G. 113
H. 72
J. 12π
K. 3π
39. The average of 7 consecutive numbers is 16. What is the sum of the least and greatest of the 7 integers?
- A. 13
B. 14
C. 16
D. 19
E. 32

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DO YOUR FIGURING HERE.

40. In the figure below, $ABCD$ is a trapezoid. Point E lies on line AD , and angle measures are as marked. What is the measure of angle BDC ?



- F. 25°
G. 30°
H. 45°
J. 55°
K. 100°
41. For which of the following functions is $f(-5) > f(5)$?
- A. $f(x) = 6x^2$
B. $f(x) = 6$
C. $f(x) = 6/x$
D. $f(x) = 6 - x^3$
E. $f(x) = x^6 + 6$
42. For what value of n would the following system of equations have an infinite number of solutions?
- $$3a + b = 12$$
- $$12a + 4b = 3n$$
- F. 4
G. 9
H. 16
J. 36
K. 48
43. If x and y are positive integers such that the greatest common factor of x^2y^2 and xy^3 is 27, then which of the following could y equal?
- A. 81
B. 27
C. 18
D. 9
E. 3

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54. If $\cos \theta = -\frac{3}{5}$ and $\frac{\pi}{2} < \theta < \pi$, then $\tan \theta =$?

F. $-\frac{5}{4}$

G. $-\frac{4}{3}$

H. $-\frac{3}{5}$

J. $\frac{3}{4}$

K. $\frac{3}{5}$

55. The City Council has approved the construction of a circular pool in front of City Hall. The area available for the pool is a rectangular region 12 feet by 18 feet, surrounded by a brick wall. If the pool is to be as large as possible within the walled area, and edge of the pool must be at least 2 feet from the wall all around, how many feet long should the radius of the pool be?

A. 14

B. 10

C. 7

D. 5

E. 4

56. Kate rode her bicycle to visit her grandmother. The trip to Kate's grandmother's house was mostly uphill, and took m minutes. On the way home, Kate rode mostly downhill and was able to travel at an average speed twice that of her trip to her grandmother's house. Which of the following expresses the total number of minutes that Kate bicycled on her entire trip?

F. $3m$

G. $2m$

H. $m + \frac{1}{2}$

J. $\frac{3m}{2}$

K. $\frac{m}{2}$

57. Let n equal $3a + 2b - 7$. What happens to the value of n if the value of a increases by 2 and the value of b decreases by 1?

A. It is unchanged.

B. It decreases by 1.

C. It increases by 4.

D. It decreases by 4.

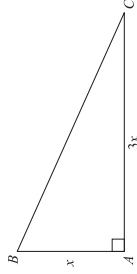
E. It decreases by 2.

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DO YOUR FIGURING HERE.

58. In the figure below, $\triangle ABC$ is a right triangle with legs that measure x and $3x$ inches, respectively. What is the length, in inches, of the hypotenuse?



F. $\sqrt{10}x$

G. $\sqrt{3}x$

H. $\sqrt{2}x$

J. $2x$

K. $4x$

59. If the edges of a cube are tripled in length to produce a new, larger cube, then the larger cube's surface area is how many times larger than the smaller cube's surface area?

A. 3

B. 9

C. 18

D. 27

E. 54

60. Considering all values of a and b for which $a + b$ is at most 9, a is at least 2, and b is at least -2 , what is the minimum value of $b - a$?

F. 0

G. -7

H. -11

J. -13

K. -15

STOP! IF YOU HAVE TIME LEFT OVER, CHECK YOUR WORK ON THIS SECTION ONLY. END OF THE MATHEMATICS TEST.